

MIL-I-631D
AMENDMENT 6
2 June 1987
SUPERSEDING
AMENDMENT 5
20 June 1968

MILITARY SPECIFICATION
INSULATION, ELECTRICAL, SYNTHETIC-RESIN
COMPOSITION, NONRIGID

This amendment forms a part of MIL-I-631D, dated 15 November 1961, and is approved for use by all Departments and Agencies of the Department of Defense.

PAGE 2

2.1, under SPECIFICATIONS, FEDERAL: Delete "L-P-406 - Plastics, Organic: General Specifications, Test Methods" and substitute "TT-S-735 - Standard Test Fluids: Hydrocarbon."

2.1, under SPECIFICATIONS, MILITARY: Delete "MIL-S-3136 - Standard Test Fluids, Hydrocarbon and Iso-Octane."

2.1: Add the following under "STANDARDS":

"FEDERAL
FED-STD-406 - Plastics: Methods of Testing."

* 2.2: Delete and substitute:

"2.2 Other publications. The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of the documents which are DoD adopted shall be those listed in the issue of the DoDISS specified in the solicitation. Unless otherwise specified, the issues of documents not listed in the DoDISS shall be the issue of the nongovernment documents which is current on the date of the solicitation.

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AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

D 150 - A-C Loss Characteristics and Dielectric Constant
(Permittivity) of Solid Electrical Insulating
Materials, Tests for.

D 876 - Nonrigid Vinyl Chloride Polymer Tubing, Testing.

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.)

* UNIFORM CLASSIFICATION COMMITTEE AGENT

Uniform Freight Classification Ratings, Rules and Regulations

(Application for copies should be addressed to the Uniform Classification Committee Agent, Tariff Publication Officer, Room 1106, 222 South Riverside Plaza, Chicago, IL 60606.)

(Nongovernment standards and other publications are normally available from the organizations which prepare or which distribute the documents. These documents also may be available in or through libraries or other informational services.)"

3.1: Delete and substitute:

- * "3.1 Qualification for types A, C, F and G only. Electrical insulation for types A, C, F and G furnished under this specification shall be a product which is qualified for listing on the applicable qualified products list at the time set for opening of bids (see 4.3 and 6.3)."

Add as new paragraph 3.1.1:

- * "3.1.1 First article inspection for types B, D and E only. When specified in the contract or order, a sample shall be subjected to first article inspection (see 4.3.1.1 and 6.4)."

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- * 3.2.1, line 3: Delete "Bureau of Ships" and substitute "Naval Sea Systems Command".

3.3.1.1, first sentence: Delete and substitute "Film is defined as material with a thickness of 0.010 inch or less, in widths greater than 3 inches."

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Table I, title: Delete "0.002" and substitute "0.010".

Table I, column 9: For dielectric strength, delete "3,500" through "85" inclusive and substitute "3,500", "3,200", "3,000", "80", "80", and "85". For elongation, insert "50" between "50" and "35".

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PAGES 5 and 6

Table II: Delete and substitute:

"TABLE II. Property values of synthetic-resin electrical insulation - forms S and I (greater than 0.010 inch in thickness).

Property to be tested	Test reference	Conditioning procedure (sec 4.4)	Unit of value	Nominal thickness	Value required for each type of material									
					A	B	C	D	E	F Grade	G			
Dielectric constant (form S only) At 1 kilo-cycle At 1 mega-cycle	4.6.3	C-96/23/0 C-96/23/96 C-96/23/0 C-96/23/96	Maximum	.....		2.5	2.5	4.0	4.5	4.0	5.0	7.0	3.5
			Maximum	.....		2.7	2.7	5.0	6.7	5.0	6.0	8.0	3.7
			Maximum		2.5	2.5	4.0	4.5	4.0	3.3
			Maximum		2.7	2.7	5.0	7.0	5.0	3.5
Volume resistivity (form S only)	4.6.4.1	C-96/23/0 C-96/23/96	Ohm-centimeters (minimum)	.....		1017	1013	1013	1014	1013	1011	1015	
			Ohm-centimeters (minimum)	.....		1016	1012	1010	1012	1012	1012	1010	1015
Tensile strength	4.6.5.1	C-96/23/50	P.S.I. (minimum)	.....		1,400	5,000	6,000	3,500	3,500	1,800	17,000	
			P.S.I. (minimum)	.014		.....	.....	.....	.....	.....	.....	.....	16,000
Elongation	4.6.5.1	C-96/23/50 C-96/23/50 E-400/100	Percent (minimum)	.010		350	25	10	25	15	200	80		
			Percent (minimum)	.014		.....	.....	.....	.....	.....	.....	.....	100
			Percent (maximum)	.014		.....	100	50	100	100	100	450	.....
			Percent change (maximum)	.....		.....	.....	.....	.....	.....	.....	.....	35
Elongation	4.6.5.2	E-400/130 C-96/23/50	Percent change (maximum)	.....		.....	.....	.....	.....	.....	.....	25	
			Percent (minimum)	.014		.....	.....	.....	.....	.....	.....	.....	25
Softening temperature (penetration)	4.6.7	C-96/23/50	Degrees centigrade (minimum)	.....		65	120	160	110	120	75	200	
			Degrees centigrade (minimum)	.....		.....	.....	.....	.....	.....	.....	.....	.....
Lengthwise shrinkage	4.6.8	E-2/100 E-2/150	Percent (maximum)		2.0	3.0	3.0	2.0	5.0	10.0		
			Percent (maximum)	5.0	

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"TABLE II. Property values of synthetic-resin electrical insulation - forms S and T (greater than 0.010 inch in thickness). - Continued

Property to be tested	Test reference	Conditioning procedure (see 4.4)	Unit of value	Nominal thickness	Value required for each type of material										
					A	B	C	D	E	F Grade ^a	C				
Dielectric strength ^{1/}	4.6.2	C-96/23/0	Volts per mil (minimum)	Inch	Natural colors										
					Other colors										
					3,100	1,900	2,600	1,200							
					2,400	1,550	2,150	1,070							
					.0075										
					.008	1,300	1,800	960							
					.010	1,200	1,550	920							
					.012										
					.014										
					.016	1,300									
					.020	1,100	900	840	1,200	940	820				
.025	960	820	760	920	740	630									
.030	870	760	700	830	700	570									
.040	740	640	620	700	600	480									
.050	660	550	550	610	530	430									
.060	600	490	490	540	450	400									
Dielectric strength ^{1/}		C-96/23/96	Percent of dry value obtained on test (minimum)	All thicknesses	75	85	75	55	90	90	90	.....		
Dielectric strength ^{1/}		C-96/23/96	Percent of dry value obtained on test (minimum)	Inch	.....	.....	.....	.....	.....	.....	.....	85			
				.003	.....	.....	.....	.....	.....	.....	.....	90			
				.005	.....	.....	.....	.....	.....	.....	.....	90			
				.0075	.....	.....	.....	.....	.....	.....	.....	90			
				.010	.....	.....	.....	.....	.....	.....	.....	90			
				.014	.....	.....	.....	.....	.....	.....	.....	90			
Dissipation factor (form S only) At 1 kilo-cycle At 1 megacycle	4.6.3	C-96/23/0 C-96/23/96 C-96/23/0 C-96/23/96	Maximum Maximum	..... .....	0.0006	0.0025	0.02	0.035	0.015	0.08	0.14	0.006	0.006		
					.0008	.0040	.03	.070	.03	.08	.16	.0065			
					.0006	.0025	.045	.05	.028	.....	.....	.030			
					.0008	.0040	.055	.07	.045	.....	.....	.035			

^{1/} For thickness not shown, the dielectric strength shall be that given for the nearest thickness shown."

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Table IV: Delete and substitute:

"TABLE IV. Standard thicknesses of film and film tape
(form F and subform T_f).

Nominal thickness	Tolerance (+)	
	Type G	Other types
Inch	Inch	Inch
0.0005	0.0001	.....
.0010	.0002	0.0001
.0015	.0004	.0002
.002	.0004	.0002
.003	.0004	.....
.005	.0005	.....
.0075	.0005	.....
.01	.0005	.....

Table V: Opposite ".010" insert ".0016" under type G. Between ".012" and ".016" insert ".014" under nominal thickness and ".0020" under type G.

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Table VII: Delete and substitute:

"TABLE VII. Tubing lengths.

Nominal inside diameter	Minimum length
Inch	Feet
0.022 - 0.027	1,200
.034 - .059	1,000
.066 - .166	500
.186 - .330	200
.360 - .600	100
.600 and over	50

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* 4.1: Delete and substitute:

"4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or purchase order, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

"4.1.1 Responsibility for compliance. All items must meet all requirements of sections 3 and 5. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of assuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling in quality conformance does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to acceptance of defective material."

* 4.2 Delete and substitute:

"4.2 Classification of inspections. The inspection requirements specified herein are classified as follows:

- (a) Qualification inspection (see 4.3).
- (b) First article inspection (see 4.3.1.1).
- (c) Acceptance inspection (see 4.4)."

4.3 and footnote 1/: Delete and substitute:

* "4.3 Qualification inspection for types A, C, F and G only. Qualification inspection for types A, C, F and G electrical insulation shall be conducted at a laboratory satisfactory to Naval Sea Systems Command. Qualification inspection shall consist of the examinations of 4.3.2 and the tests specified in table XI."

4.3.1: Delete and substitute:

"4.3.1 Samples. Separate samples for each type, form, and subform of material for which approval is requested shall be furnished in sizes and quantities shown in table X (see 4.3.2.2). Qualification for forms U_a and U_b may be obtained separately because of the large number of sizes in these subforms. The same applies to both subforms (T_f and T_g) under form T. If all of the thicknesses or sizes shown in table X are not tested, the qualification will apply only to the thickness or size tested."

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4.3.1.1: Add as new paragraph:

- * "4.3.1.1 First article inspection for types B, D and E only. First article inspection for types B, D and E electrical insulation shall consist of the examinations of 4.3.2 and the tests specified in table XI."

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4.6.12.2, line 1: Delete "Specification L-P-406" and substitute "FED-STD-406".

4.6.12.3, lines 2 and 3: Delete "Specification L-P-406" and substitute "FED-STD-406".

4.6.12.4, line 4: Delete "Specification L-P-406" and substitute "FED-STD-406".

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4.6.14.2, line 2: Delete "Specification MIL-S-3316" and substitute "TT-S-735".

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5.2.1, listing: Last line of listing opposite "PPP-8-636", delete "Class 12" and substitute "Class weather resistant".

5.2.2, listing: Last line of listing opposite "PPP-B-636", delete "Class 12" and substitute "Class weather resistant".

6.3 and 6.4: Delete and substitute:

- * "6.3 Qualification. With respect to products requiring qualification, awards will be made only for products which are, at the time set for opening of bids, qualified for inclusion in Qualified Products List QPL-631 whether or not such products have actually been so listed by that date. The attention of the contractors is called to these requirements, and manufacturers are urged to arrange to have the products that they proposed to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or purchase orders for the products covered by this specification. The activity responsible for the Qualified Products List is the Naval Sea Systems Command, SEA 5523, Department of the Navy, Washington, DC 20362-5101 and information pertaining to qualification of products may be obtained from that activity. Application for qualification tests shall be made in accordance with "Provisions Governing Qualification SD-6" (see 6.3.1).
- * 6.3.1 Copies of "Provisions Governing Qualification SD-6" may be obtained upon application to Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.

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- * 6.4 First article. When first article inspection is required, the items should be a first article sample. The first article should consist of one unit. The contracting officer should include specific instructions in acquisition documents regarding arrangements for examinations, approval of first article test results and disposition of first articles. Invitations for bids should provide that the Government reserves the right to waive the requirement for samples for first article inspection to those bidders offering a product which has been previously acquired or tested by the Government, and that bidders offering such products, who wish to rely on such production or test, must furnish evidence with the bid that prior Government approval is presently appropriate for the pending contract."

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Notice: Delete in its entirety.

LAST PAGE

- * DD 1426, Standardization Document Improvement Proposal: Delete address and substitute:

"COMMANDER
NAVAL SEA SYSTEMS COMMAND (SEA 5523)
DEPARTMENT OF THE NAVY
WASHINGTON, DC 20362-5101"

The margins of this amendment are marked with an asterisk to indicate where changes (additions, modifications, corrections, deletions) from the previous amendment were made. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations and relationship to the last previous amendment.

Custodians:

Army - ER
Navy - SH
Air Force - 20

Preparing activity:

Navy - SH
(Project 5970-1007)

Review activities:

Army - AR, MI, EA
Navy - AS, EC, YD, OS
Air Force - 99

User activity:

Army - ME